as those with hiatal hernia, pregnancy, "full" stomach, intestinal ileus, or obstruction. Its use does not guarantee protection from aspiration. Other relative contraindications include decreased pulmonary compliance (one-lung ventilation, thoracic trauma, pulmonary fibrosis) and concurrent airway disease (tumor, abscess, inflammation, hemorrhage). This airway, however, has been used in many of these situations as a life-saving device when conventional airway management techniques have failed.

This airway is a device that is easy to use and provides an excellent airway in many clinical situations. The simplicity of the technique, however, is based on a thorough knowledge of proper insertion technique and strict adherence to testing and cleaning protocols. Clinical judgment and competency must always guide airway management decisions.

LINDA I. WAT, MD
Loma Linda, California

REFERENCES

Nair I, Bailey PM. Review of uses of the laryngeal mask in ENT anaesthesia. Anaesthesia 1995; 50:898–900

Verghese C, Brimacombe JR. Survey of laryngeal mask airway usage in 11,910 patients: safety and efficacy for conventional and nonconventional usage. Anesth Analg 1996; 82:129–133

Asai T, Morris S. The laryngeal mask airway: its features, effects and role. Can J Anesthesiol 1994; 41:930-960

Remifentanil: An Esterase-Metabolized Opioid

REMIFENTANIL is a new synthetic opioid that was recently approved for clinical use. Although chemically related to the other fentanyl congeners, remifentanil is structurally unique because of its ester linkages. Its ester structure renders it susceptible to hydrolysis by blood- and tissue-nonspecific esterases, resulting in rapid metabolism to essentially inactive products. Remifentanil thus constitutes the first true ultra-short-acting opioid for use as a supplement to general anesthesia.

Pharmacodynamically, remifentanil is a pure μ receptor agonist with the same spectrum of primary and adverse effects as the other fentanyl congeners. Therapeutically, it can be used for its analgesic, sedative, and minimum alveolar concentration–reducing properties. Its side-effect profile includes respiratory depression, hemodynamic depression, muscular rigidity, nausea, vomiting, and pruritus. Both the therapeutic and toxic effects are reversible with the use of naloxone hydrochloride, although remifentanil is so short-acting that naloxone is unlikely to be needed during routine clinical use. Its potency is similar to that of fentanyl.

The unique aspect of remifentanil is its short-acting pharmacokinetics. Remifentanil's clearance is several times greater than normal hepatic blood flow, consistent with widespread extrahepatic hydrolysis by blood and tissue esterases. Several high-resolution studies in both volunteers and patients have confirmed its very-short-acting pharmacokinetic profile. Not surprisingly, because of its esterase metabolism, remifentanil's pharma- cokinetics are not altered by hepatic or renal failure.

Remifentanil's context-sensitive half-time ($CST_{1/2}$) is perhaps the most intuitively meaningful evidence of its short-acting pharmacokinetics. Its $CST_{1/2}$ is short (about 4 minutes) and independent of infusion duration. This means that despite long infusions, drug concentrations will decline by 50% within about four minutes of stopping the infusion. Remifentanil is also a rapid-acting drug in terms of its onset of effect. Several studies have confirmed that the drug has a short latency to peak effect after the administration of a bolus that is similar to that of alfentanil hydrochloride.

A few precautions regarding the use of remifentanil deserve emphasis. Because of its short duration of action, an excessively rapid decline in analgesia can occur if the drug is not administered carefully. An undetected infusion pump malfunction, for example, could conceivably result in an unintended, rapid dissipation of the anesthetic state intraoperatively. A related disadvantage is that for a sustained effect, remifentanil must be administered by continuous infusion, a method of delivery that some practitioners may find inconvenient. Finally, because remifentanil is formulated with glycine, an inhibitory neurotransmitter, it is not approved for epidural or intrathecal use.

Although it is premature to predict exactly what role remifentanil will play in modern anesthesia practice, it could conceivably be used for any intravenous application for which the previously marketed fentanyl congeners are used. Remifentanil is obviously best suited for cases in which a rapid emergence from anesthesia is desirable. Outpatient surgery, neurosurgery, painful diagnostic procedures, or therapeutic procedures in an intensive care unit are just a few examples where the drug's short-acting pharmacokinetic profile might be exploited. It is possible that remifentanil may enable the creation of new, cost-saving clinical pathways. For example, it may be possible to define anesthetic techniques and surgical procedures in which selected patients may be able to bypass the postanesthesia recovery room. Widespread clinical use of remifentanil will be required before the theoretic advantages associated with a short-acting opioid can be confirmed.

TALMAGE D. EGAN, MD
Salt Lake City, Utah

REFERENCES

Egan TD, Lemmens HJM, Fiset P, Hermann DJ, Muir KT, Stanski DR, et al: The pharmacokinetics of the new short-acting opioid remifentanil (GI 87084B) in healthy adult male volunteers. Anesthesiology 1993; 79:881-892

Egan TD, Minto CF, Hermann DJ, Barr J, Muir KT, Shafer SL. Remifentanil versus alfentanil: comparative pharmacokinetics and pharmacodynamics in healthy adult male volunteers. Anesthesiology 1996; 4:821–833

Glass PSA, Hardman D, Kamiyama Y, Quill TJ, Marton G, Donn KH, et al. Preliminary pharmacokinetics and pharmacodynamics of an ultra-short-acting opioid: remifentanil (GI87084B). Anesth Analg 1993; 77(5):1031–1040

Westmoreland CL, Hoke JF, Sebel PS, Hug CC, Muir KT. Pharmacokinetics of remifentanil (GI87084B) and its major metabolite (GI90291) in patients undergoing elective inpatient surgery. Anesthesiology 1993; 79:893–903